

CLAIMS

1. A microfluidic device that comprises a microchannel structure in which there are one, two or more flow paths (101;201a,b;301a,a',b) all of which comprises a porous bed I (104,204,304) that is common for all of the flow paths, which bed exposes an
5 immobilized reactant R that is capable of interacting with a solute S that passes through the bed, **characterized** in that at least one (101;201a;301a,a') of the flow paths (101;201a,b;301a,a',b) comprises/comprise a second porous bed II (105,205,305) that is placed upstream of porous bed I (104,204,304) and is dummy with respect to interaction with solute S but capable of interacting with a substance DS that is present in a liquid
10 aliquot together with solute S and is capable of disturbing the result of the interaction between solute S and said immobilized reactant R.
2. The microfluidic device of claim 1, **characterized** in that porous bed I (104,204,304) and porous bed II (105,205,305) are physically separated from each other.
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3. The microfluidic device of claim 1, **characterized** in that the upstream end of porous bed I (104,204,304) is abutted to the downstream end of porous bed II (105,205,305).
4. The microfluidic device of claim 3, **characterized** in that there is a porous membrane
20 (106) between said upstream end and said downstream end.
5. The microfluidic device according to any of claims 1-4, **characterized** in that at least one of porous bed I (104,204,304) and porous bed II (105,205,305) bed is a packed bed of particles and the remaining porous bed, if any, is a porous monolithic plug.
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6. The microfluidic device according to any of claims 1-5, **characterized** in that at least one of porous bed I (104,204,304) and porous bed II (105,205,305) comprises a solid phase material that is a size exclusion material.
- 30 7. The microfluidic device according to any of claims 1-6, **characterized** in that a) the disturbing substance is smaller than solute S and that at least porous bed II (105,205,305) in at least one of said at least one flow path comprises a solid phase material that is a size exclusion material having an exclusion limit delaying the disturbing substance from passing through porous bed II) in relation to solutes.

8. The microfluidic device according to any of claims 1-6, **characterized** in that at least one, two or more (201b;301b) of the remaining ones of said one, two or more flow paths (101;201a,b;301a,a',b) is/are devoid of porous bed II.
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9. The microfluidic device according to any of claims 1-7, **characterized** in that porous bed II in said at least one, two or more flow paths comprises/comprise an immobilised reagent R_{DS} that is capable of interacting with the disturbing substance that is present together with a solutes.
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10. The microfluidic device of claims 1-8, **characterised** in that said at least one flow path is two or more flow paths and that R_{DS} in at least one of said two or more flow paths differs from R_{DS} in at least one of the remaining ones of said two flow paths.
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11. A microfluidic process carried out in a flow path (101;201a;301a,a') of a microchannel structure of a microfluidic device and comprising transporting a liquid aliquot containing a solute S through a porous bed I (104,204,304) that is placed in said flow path (101;201a;301a,a') and exhibits an immobilized reactant R that is capable of interacting with solute S during the transport, **characterized** in comprising the steps of
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- (i) providing said flow path (101;201a;301a,a') in a form that comprises a porous bed II (105,205,305) that is upstream of porous bed I (104,204,304) and dummy with respect to interaction with solute S but capable of interacting with a disturbing substance DS,
- (ii) providing a liquid aliquot containing said solute S and said disturbing substance in
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- said flow path (101;201a;301a,a') in a position that is upstream of porous bed II (105,205,305),
- (iii) transporting the aliquot through porous bed II (105,205,305), and
- (iv) transporting subsequently solute S through porous bed I (104,204,304) to allow for the interaction with reactant R.
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12. A microfluidic device in which there is microchannel structure that comprises one, two or more flow paths (101;201a,b;301a,a',b) each of which comprises a porous bed I (104,204,304) that is common for all of said flow paths and at least one of which (101;201a;301a,a') comprises a porous bed II (105,205,305) which is upstream of porous

bed I (104,204,304), **characterized** in that one or both of porous bed I (104,204,304) and porous bed II (105,205,305) in said at least one flow path (101;201a;301a,a') comprises a solid phase material containing a generic ligand.3.

5 13. The microfluidic device of claim 12, **characterized** in the generic ligand in porous bed II (105,205,305) in one or more of said at least one flow path (101;201a;301a,a') are the same as in porous bed I.

10 14. The microfluidic device of claim 12, **characterized** in the generic ligand in porous bed II (105,205,305) in one or more of said at least one flow path (101;201a;301a,a') is an affinity counterpart (anti-ligand) to the ligand in porous bed I (104,204,304).

15 15. The microfluidic device of any of claims 12-13, **characterized** in that said ligand is selected amongst biotin and anti-biotins.

16. The microfluidic device of any of claims 12-15, **characterized** in that there is only one flow path (101) comprising both porous bed I (104,204,304) and porous bed II (105,205,305).

20 17. The microfluidic device of claim 16, **characterized** in that the downstream end of porous bed II (105,205,305) is abutted to the upstream end of porous bed I (104,204,304), possibly with a porous membrane between the ends.